

1 WHAT IS CLAIMED IS:

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3 1. An antioxidant system comprising:

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5 a. sulfurized isobutylene and

6

7 b. one or more hindered phenols.

8

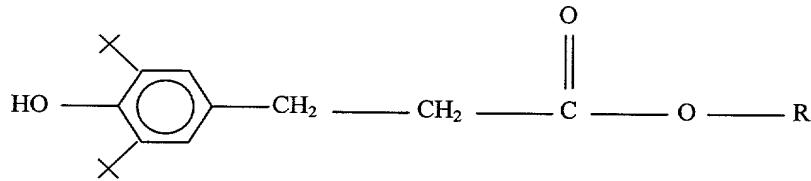
9 2. An antioxidant system of Claim 1 wherein the hindered phenols
10 comprise BHT and 3,5-di-t-butyl 4-hydroxy phenol propionate.

11

12 3. An antioxidant system of Claim 1 wherein the hindered phenols
13 comprise BHT.

14

15 4. An antioxidant system of Claim 1 wherein one or more hindered
16 phenols have the general formula:



22 5. An antioxidant system of Claim 4, wherein the antioxidant system
23 further comprises BHT.

24

25 6. An antioxidant system of Claim 1 wherein the one or more hindered
26 phenols comprise 3,5-di-t-butyl 4-hydroxy phenol propionate.

27

28 7. Lubricating oil comprising a base oil and the antioxidant system of
29 Claim 1.

30

31 8. Lubricating oil comprising a base oil and the antioxidant system of
32 Claim 2.

33

1 9. Lubricating oil comprising a base oil and the antioxidant system of
2 Claim 3.

3

4 10. Lubricating oil comprising a base oil and the antioxidant system of
5 Claim 4.

6

7 11. A method of lubricating engines comprising contacting the lubricating
8 oil of Claim 7 with one or more engines.

9

10 12. A method for making a lubricating oil comprising combining the
11 antioxidant system of Claim 6 with base oil in any order.

12

13 13. A method of lubricating engines comprising lubricating one or more
14 engines with the lubricating oil of Claim 8.

15

16 14. A method of lubricating engines comprising contacting one or more
17 engines with the lubricating oil of Claim 9.

18

19 15. A method of lubricating engines comprising contacting one or more
20 engines with lubricating oil of Claim 10.

21

22 16. A method of Claim 15 wherein the engine is a natural gas fueled
23 engine.

24

25 17. Lubricating oil comprising:
26
27 about 1 wt. % to about 8 wt. % of one or more dispersants;
28
29 about 1 wt. % to about 8.5 wt. % of one or more detergents;
30
31 about 0.2 wt. % to about 1.5 wt. % of one or more wear inhibitors;
32
33 about 0.01 wt. % to about 0.5 wt. % sulfurized isobutylene;

1
2 about 0.1 wt. % to about 3 wt. % butylated hydroxy toluene;
3
4 and about 0.1 wt. % to about 3 wt. % 3,5-di-t-butyl 4-hydroxy phenol
5 propionate.

6
7 18. A method of lubricating engines comprising lubricating one or more
8 engines with the lubricating oil of Claim 17.

9
10 19. A method of making the lubricating oil of Claim 17 comprising
11 combining;

12
13 about 1 wt. % to about 8 wt. % of one or more dispersants;

14
15 about 1 wt. % to about 8.5 wt. % of one or more detergents;

16
17 about 0.2 wt. % to about 1.5 wt. % of one or more wear inhibitors;

18
19 about 0.01 wt. % to about 0.5 wt. % sulfurized isobutylene;

20
21 about 0.1 wt. % to about 3 wt. % butylated hydroxy toluene; and

22
23 about 0.1 wt. % to about 3 wt. % 3,5-di-t-butyl 4-hydroxy phenol
24 propionate in any order.

25
26 20. Lubricating oil comprising:

27
28 a major amount of one or more base oils;

29
30 about 1.25 wt. % to about 6 wt. % of one or more dispersants;

31
32 about 2 wt. % to about 6 wt. % of one or more detergents;

1 about 0.3 wt. % to about 0.8 wt. % of one or more wear inhibitors;
2
3 about 0.02 wt. % to about 0.45 wt. % sulfurized isobutylene;
4
5 about 0.20 wt. % to about 2.5 wt. % butylated hydroxy toluene; and
6
7 about 0.20 wt. % to about 2.5 wt. % 3,5-di-t-butyl 4-hydroxy phenol
8 propionate.

9

10 21. A method of lubricating engines comprising contacting one or more
11 engines with the lubricating oil of Claim 20.

12

13 22. A method of making the lubricating oil of Claim 20 comprising
14 combining:
15 a major amount of one or more base oils;
16
17 about 1.25 wt. % to about 6 wt. % of one or more dispersants;
18
19 about 2 wt. % to about 6 wt. % of one or more detergents;
20
21 about 0.3 wt. % to about 0.8 wt. % of one or more wear inhibitors;
22
23 about 0.02 wt. % to about 0.45 wt. % sulfurized isobutylene;
24
25 about 0.20 wt. % to about 2.5 wt. % butylated hydroxy toluene; and
26
27 about 0.20 wt. % to about 2.5 wt. % 3,5-di-t-butyl 4-hydroxy phenol
28 propionate in any order.

29

30 23. Lubricating oil comprising:
31
32 a major amount of one or more base oils;
33

1 about 1.25 wt. % to about 6.00 wt. % of one or more dispersants;
2
3 about 2 wt. % to about 6 wt. % of one or more detergents;
4
5 about 0.30 wt. % to about 0.80 wt. % of one or more wear inhibitors;
6
7 about 0.02 wt. % to about 0.45 wt. % sulfurized isobutylene,
8
9 about 0.20 wt. % to about 2.5 wt. % butylated hydroxy toluene;
10
11 and about 0.20 wt. % to about 2.50 wt. % 3,5-di-t-butyl 4-hydroxy
12 phenol propionate.

13
14 24. A method of lubricating engines comprising contacting one or more
15 engines with the lubricating oil of Claim 23.

16
17 25. Lubricating oil for use in engines comprising sulfurized isobutylene.

18
19 26. Method of lubricating natural gas engines comprising contacting the
20 lubricating oil of Claim 25 with one or more natural gas engines.

21
22 27. Lubricating oil comprising:

23
24 about 0.02 wt. % to about 2 wt. % sulfurized isobutylene;

25
26 about 1 wt. % to about 8 wt. % of one or more dispersants;

27
28 about 1 wt. % to about 8.5 wt. % of one or more of phenates,
29 salycilates and sulfonates;

30
31 about 0.2 wt. % to about 1.5 wt. % of one or more wear inhibitors; and
32 one or more of Group I, II, III and IV base oil.

33

1 28. A method of making the lubricating oil of Claim 27 comprising blending
2 about 0.02 wt. % to about 2 wt. % sulfurized isobutylene;
3
4 about 1 wt. % to about 8 wt. % of one or more dispersants;
5
6 about 1 wt. % to about 8.5 wt. % of one or more of phenates,
7 salsilicates and sulfonates;
8
9 about 0.2 wt. % to about 1.5 wt. % of one or more wear inhibitors; and
10
11 one or more of Group I, II, III and IV base oil in any order with agitation
12 and at a temperature sufficient to blend the components but not high
13 enough to degrade the components.

14
15 29. A method of lubricating an engine comprising lubricating the engine
16 with the lubricating oil of Claim 27.

17
18 30. Lubricating oil comprising:

19
20 a major amount of one or more base oils;
21
22 about 1.25 wt. % to about 6 wt. % of one or more dispersants;
23
24 about 2 wt. % to about 6 wt. % of one or more detergents;
25
26 about 0.3 wt. % to about 0.8 wt. % of one or more wear inhibitors; and
27
28 about 0.04 wt. % to about 1.75 wt. % sulfurized isobutylene.

29
30 31. A method of making the lubricating oil of Claim 30 comprising
31 combining about 1.25 wt. % to about 6 wt. % one or more dispersants;
32
33 about 2 wt. % to about 6 wt. % of one or more detergents;

1
2 about 0.3 wt. % to about 0.8 wt. % of one or more wear inhibitors; and
3

4 about 0.04 wt. % to about 1.75 wt. % sulfurized isobutylene
5

6 in any order.
7

8 32. A method of lubricating engines comprising contacting the lubricating
9 oil of Claim 30 with one or more engines.